N481: Fiber-Optic Sensing: Introduction to the Technology and In-Well Sensing Applications

Instructor(s): Dennis Dria

1 Day	Competence Level: Foundation
	Classroom Course

Summary

This course introduces petroleum engineers and geoscientists to fiber-optic sensing technology that is used for well and reservoir diagnostics and surveillance. It provides in-depth technology awareness, including underlying theories of operation and breadth of well and reservoir applications, and the basic tools to determine whether fiber-optic sensing has the potential to address key well and reservoir uncertainties. The engineer and geoscientist will leave with an understanding of how fiber-optic sensors work, and how to use that knowledge to define where and how fiber-optic sensing can create value for specific well and reservoir types.

Learning Outcomes

Participants will learn to:

1. Determine cases where fiber-optic sensing can provide data to optimize completion and stimulation design and improve hydrocarbon recovery.
2. Compare and contrast fiber-optic sensing relative to other diagnostic and surveillance monitoring methods.
3. Evaluate predicted well production/injection performance to assess efficacy of DTS, DAS, stand-alone single-point fiber-optic sensors and sensor arrays.
4. Screen well completion and reservoir development scenarios using technical and economic analyses.
5. Apply simple cost:benefit models for fiber-optic data acquisition in specific well types.
6. Build project plan outline for start-to-finish FO data acquisition system design, vendor and equipment selection, data management and interpretation.

Duration and Training Method

N481 is a one-day classroom based course. Training consists of lectures, class discussion, exercises and case histories.

Who Should Attend

This course is designed for petroleum engineers and geoscienctists who want an understanding of how fiber-optic sensors work and how to use that knowledge to define where and how fiber-optic sensing can create value for specific well and reservoir types.

Prerequisites and Linking Courses

A basic understanding of physics and petroleum engineering is required. The follow-on, skilled application course is N473, Fiber-Optic Sensing: Diagnostic and Surveillance Applications and Deployment.

Course Content

- What is Fiber-Optic Sensing (FOS): basic physics and engineering of the FOS system components: fibers, coatings, cabling, connectors optical fibers, sensor types, instrumentation.
- Why we would want to use FOS: advantages and disadvantages vs. other sensing/monitoring technologies.
    - Single-point FO sensors: P, T, seismic/acoustic

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- Distributed FO sensing: temperature (DTS), acoustics (DAS), strain (DSS)
- Overview of the different applications
- Survey of FOS system deployment methods
    - Permanently installed FOS
    - FO "logging" interventions & temporary installations
- Data management and analysis / interpretation
- Factors that influence FOS system selection
- High-level screening of candidate wells and justification for installing FOS.